

What Is Claimed Is:

1. A method for producing a micromechanical device, especially a micromechanical oscillating mirror device, by exposing a vertically deflectable, in particular, tilttable, island region (6) made of silicon, using an etching process in a silicon substrate layer (1) lying below the island region, characterized by the steps:
 - making available an SOI substrate or an EOI substrate having an Si functional layer (3) which is provided, while an oxide layer (2) is interposed, on a silicon substrate layer (1), whose upper region is provided as a sacrificial layer;
 - forming at least one trench (5) that reaches through the functional layer (3) up to the oxide layer (2), by a first anisotropic plasma etching step which exposes the later island region (6) laterally with respect to the functional layer (3);
 - generating a passivating layer (10) that covers at least the sidewalls of the trench (5), and subsequent opening of the trench bottom up to the silicon substrate layer (1) by a physical directed etching method;
 - deep etching of the trench (5) using a second anisotropic plasma etching step starting from the opened trench floor (11) and going to a predetermined depth of the silicon substrate layer (1), this plasma etching step specifying the depth of the sacrificial layer; and
 - carrying out an isotropic sacrificial layer etching step for removing a region (12) of the sacrificial layer below the island region (6) by lateral etching undercutting, starting from the trench (5), of the silicon substrate layer (1), in such a way that the

island region (6) is exposed and made vertically movable.

2. The method as recited in Claim 1, wherein the sacrificial layer etching step takes place selectively with respect to the passivating layer (10) and the oxide layer (2).
3. The method for manufacturing a micromechanical oscillating mirror device as recited in Claim 2, wherein
 - the island region (6) is connected to the region (7) of the functional layer (3) that surrounds the island region (6) via one or more connecting crosspieces (8),
 - so that the exposed island region (6) is able to carry out motions, preferably torsional motions, about the one or the several connecting crosspieces (8), which have such an amplitude that a part of the island region (6) projects into the region (12) of the silicon substrate layer (1) that has been etched free.
4. The method as recited in Claim 3, wherein narrow regions of functional layer (3) that have been left standing are used as connecting crosspieces (8).
5. The method as recited in one of Claims 1 through 4, wherein additional trench structures (9) are provided within the island region (6) and are etched to sacrificial layer depth, so that the sacrificial layer etching step is able to be performed starting from all the trenches (5, 9) simultaneously .

6. The method as recited in Claim 5,
wherein above the trench (5) and the further trench
structures (9) developed as perforation holes, at least
one additional layer (13), especially one that improves
the reflectivity of the mirror surface, is deposited in
such a way that the perforation holes (9) are closed, but
not so the trench (5) that separates the island region
(6) from the surrounding region (7).
7. The method as recited in Claim 5 or 6,
wherein the trench (5) laterally exposing the island
region (6) is developed wider than the additional trench
structures (9).
8. The method as recited in one of Claims 1 through 7,
wherein the sacrificial layer etching step takes place by
chemical dry etching, using one of the gases XeF₂, ClF₃,
NF₃ or BrF₃.
9. The method as recited in one of Claims 1 through 8,
wherein the passivating layer (10) is applied by CVD
deposition or by thermal oxidation.
10. The method as recited in one of the Claims 1 through 9,
wherein the passivating layer (10) and/or the oxide layer
(2) are removed again after the sacrificial layer etching
step, especially by a chemical dry etching using the gas
HF/H₂O.